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BROODING METHODS

It's well from time to time to review the way we do things. It's particularly important right now for each to see if his way of brooding chicks is doing the job as well and as cheaply as possible. We cannot overlook the highly competitive nature of the poultry industry today. With a favorable outlook ahead for the near future, it's a good opportunity to prepare for times that may remind us somewhat of 1954.

With this in mind, Wirthmore service supervisors have reviewed brooding methods and give you their best from field observations and other information available to them.

Hot Water Brooding

A central hot water system is rated by insurance underwriters as the safest brooding system that can be used. It carries the lowest insurance premium. A popularity poll in the Northeast would show it to be the best-liked system from the standpoint of economy of operation, quality of chicks, ease of tending, dryness of litter, disease control and practically any other consideration which might enter.

Since hovers are generally used over the pipes, hot water brooding can be considered modified cool room brooding. With much of the heat confined under the hovers, chicks are practically assured of enough heat for good brooding conditions regardless of the severity of the weather. Yet there is enough escape of heat to give considerable room temperature. It is fairly easy to maintain what scientists consider ideal brooding conditions with hot water. That is a temperature of about 90° under the hover and near 55° in the room. This is an aid in keeping litter dry and this temperature gives most economical growth on the least quantity of feed.

Occasionally hot water brooding is done by heating the entire pen. This is referred to as warm pen brooding. Even though it may give equally as good chicks as cool room brooding, it is more expensive. The evidence favors hover use.

For either hover covered or open pipes, these two arrangements offer a choice — (1) Several rows of 1¼ to 2 inch pipes. (2) A single row of finned tube having four or five times the radiation of smooth pipe.

The advantages and weak points of hot water brooding fall into these groups which, of course, deserve careful consideration:



Center of pen hot water brooding at Hubbard Farms, Walpole, New Hampshire. Building paper hover is discarded after each brood.

Advantages

- Low cost of operation
- Low depreciation cost
- Easy temperature control
- Low labor cost in operation
- Low fire hazard, resulting in lower fire insurance premiums
- Offers advantages of either warm or cool room brooding

Disadvantages

- High cost of installation
- Not suitable for small brooding units

Equipment needed for a hot water system consists of these items:

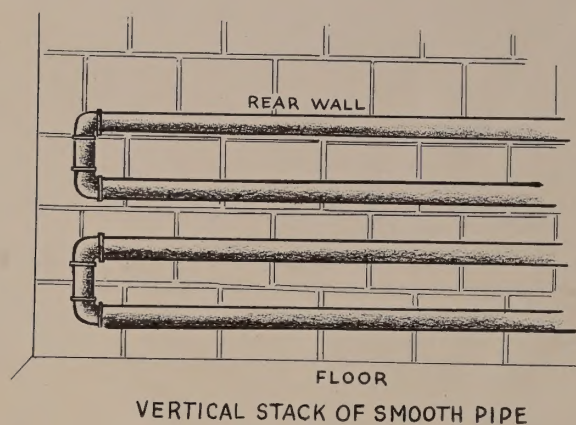
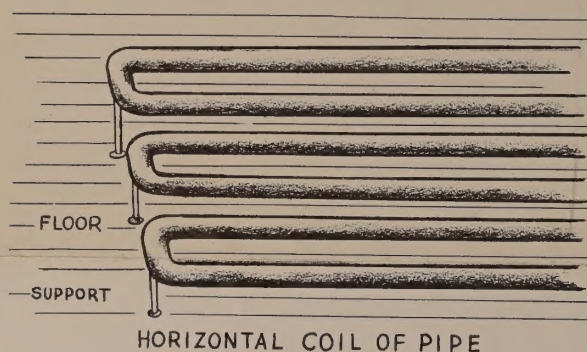
1. Hot water boiler, automatically fired with oil, gas or a stoker.
2. Circulating pump.
3. Piping system to conduct water to the brooding area and return to boiler.
4. Radiation, either pipe coils or finned tube radiators.
5. Necessary electrical controls.

Heat requirements of hot water brooding are:

1. Starting temperature of 90°-95° F.
2. Reduce 5 degrees each week for the first three weeks and then 10 degrees each week for the fourth and fifth weeks.
3. After five weeks provide near 55 degrees for maximum feed efficiency.
4. Completely enclose the heating system from the

growing area because of the prevalence of lint in the house and its damage to mechanical equipment.

Location of pipes gives a choice of two positions (1) On the rear wall with a vertical stack of pipes one above the other or a coil of several pipes directly above the floor and parallel to it. (2) Toward the center of the pen with the coil of pipes parallel to the floor.



Rear wall location makes easier cleaning of the floor while the center of the pen allows better chick movement and a greater choice of temperature range. The center of the pen gives better air movement.

The choice of type of pipe as already mentioned falls into smooth and fin or vulcan types. Here are points to be considered in making a selection.

1. Smooth pipe is used in one of three sizes — $1\frac{1}{4}$, $1\frac{1}{2}$ or 2 inches. It is used in coils or banks with a leader. The coil or bank has pipes 3 to 5 inches apart on center. The horizontal coil is 8 to 16 inches above the floor with 9 inches a popular choice. The vertical stack has the bottom 8 inches above the floor whether smooth or vulcan pipe.

2. Vulcan or fin pipe has about 5 to 8 times the amount of radiation of the smooth pipe of the same diameter depending on size and number of fins and whether the smooth pipes are used in a horizontal coil or a vertical stack. If used on the rear wall 8 inches above the floor and under a hover, one vulcan pipe 2 inches in diameter supplies enough radiation for cool room brooding in an insulated

building. The return pipe may be a smooth pipe. If the fin-type pipe is used away from the rear wall under a hover, it must be divided into two lines of pipes 24 to 36 inches apart with the radiation divided into alternate three to four foot sections of vulcan-pipe and smooth pipe. The section of vulcan pipe on one side of the hover should be opposite the smooth pipe section of the same length on the other side of the hover.

The amount of radiation needed depends upon (1) Climate, (2) Season of the year, (3) Insulation and construction of the building, (4) Height of ceiling, (5) Whether a circulating pump is used, (6) Whether more than one floor is to be heated. For winter brooding in a cold climate in a building with a 7 foot insulated ceiling and using a circulating pump, figure on $2\frac{1}{2}$ to 3 square feet of radiation per foot of hover according to this table formulated for smooth pipe.

Inside Diameter	Sq. Ft. of Radiation Per Foot of Pipe
1 inch	.34
$1\frac{1}{4}$ inch	.43
$1\frac{1}{2}$ inch	.50
2 inch	.62

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Radiation Per Foot of Hover	
with 4 pipes	with 6 pipes
1.36 sq. ft.	2.0 sq. ft.
1.72 sq. ft.	2.6 sq. ft.
2.00 sq. ft.	3.0 sq. ft.
2.50 sq. ft.	3.7 sq. ft.

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2.50 sq. ft.	3.7 sq. ft.

The rated capacity of the brooder should be twice the radiation of the pipes used. Over sized boilers are more economical especially when coal is used for fuel.

The boiler should be located as near the hover as possible, although separated from the brooding room by a fire wall or in a near-by building. By planning in this way the fire insurance premium can be lowered.

When a circulating pump is used to force the water through the pipes, distances up to 250 feet from the boiler to the farthest pen is not uncommon.

Hover material may be building paper or card board laid on horizontal coil with shavings on top or may be frames made of 1 x 2 inch strips covered with insulating board and laid on the coil of pipes. Aluminum or steel metal strips fastened to the under-side of the hover increases efficiency. Cotton bags or cloth strips or boards fastened to the side of the hover and extending down to within a few inches of the litter may be used while chicks are small and weather is cold. These should be raised or removed as the chicks require less heat. Light bulbs of $7\frac{1}{2}$ watts should be spaced 10 feet apart under the hover.

Temperature at the edge of the hover is usually 95° F. in cold weather and 90° F. in milder weather. Reduce the temperature 5 degrees a week to 60 or 65 depending on the chick comfort.

Thermostat and aquastat are two basic controls that are necessary. An aquastat, electrically operated, regulates the water temperature in the boiler and a thermostat controls the circulator pump. The location of the thermostat switch is important and should be near the hover. Yet it must be high enough so

that chickens cannot affect it by huddling near it. The switch should be sealed so it will not be affected by dust or lint.

With any central heating system, it is desirable to have stand-by electrical generators in case of power failures.

Coal Brooding

Coal brooding was once the most widely used method in the United States. Two of its outstanding features are and have been its economy of operation and its ability to maintain sufficient room temperature during cold weather.

In setting up a coal brooder, the base of the stove should set on a square cement platform about 6 inches thick and both wide and long enough so that at least 3 inches project around the base of the stove. The brooder should set so that the outside rim of the hover is at least 3 feet from the back wall. Around the hover and approximately 3 feet from the rim, a 16 inch corrugated cardboard ring or a 16 inch wire circle covered with papers or bags should be installed to protect the chicks from drafts.

To get maximum efficiency from a coal brooder, it should be started at least four days in advance of the chicks' arrival and the thermostats checked to see that they are working properly. Keep in mind that a stove well filled with coal requires less fuel.

Be cautious never to remove hot ashes from the ash box. Shake the ashes down in the morning after cleaning out the cold ashes that were shaken down from the previous night. From then on it will be a matter of cleaning out the old ashes and then shaking down the fresh ashes in that order.

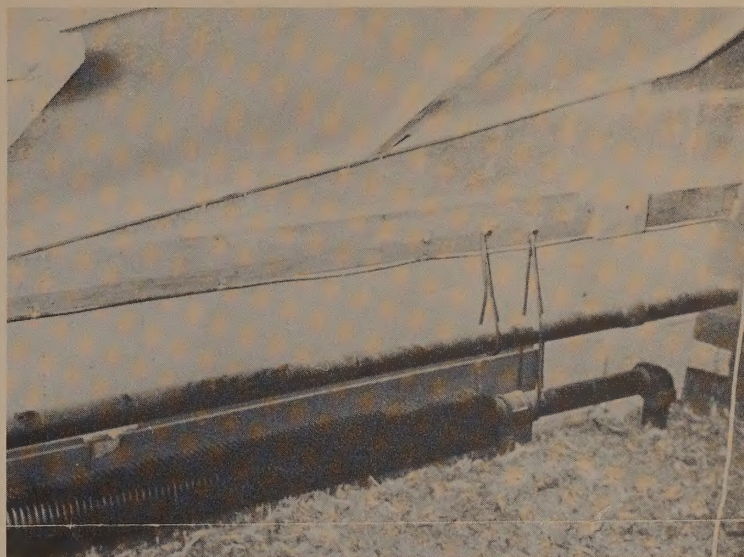
A proper brooding temperature for new chicks is 90 degrees at floor level at the rim of the hover and a room temperature of about 70 degrees. Efficient in operation as the coal brooder is, more labor is required than with most other brooding systems because of the coal and ashes that have to be handled and carried.

Gas Brooding

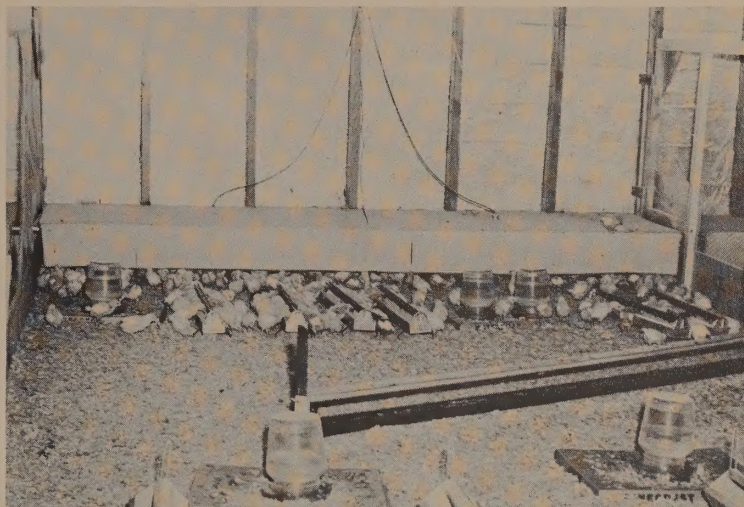
Gas brooding is a popular method with many chick growers. Three types offer a selection as follows — space heaters, gas brooders that maintain room temperature and brooders that confine the heat.

Gas brooding more easily maintains a satisfactory temperature during late spring and summer than most other individual brooders. A single warning that should be observed is that the burners or spuds on the gas stove should be kept free from dust so that they will not clog and go out. The spuds on some burners should be checked weekly and all hose connections should be checked regularly for leakage.

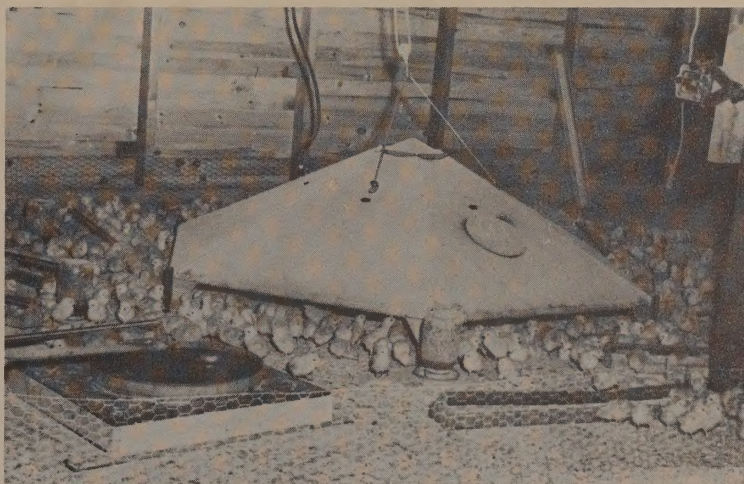
A circle similar to that used on a coal brooder installation should be used with the individual gas stoves. The chicks under both should be supplied with plenty of water and feed under the hover for 3 or 4 days. A brooding temperature of 90 degrees under the hover during the first week keeps the chicks comfortable and a room temperature of 55 degrees is about right.



Fin type hot water brooding on wall at Alger Farm, Brockton, Massachusetts.



Smooth pipe hot water system on north, insulated wall at C. M. T. broiler operations, Waterville, Maine.



Gas brooder at Chase Farm on Cape Cod.

Infra-red Brooding

Infra-red brooding is increasing slightly in the Northeast. It is necessary to use auxiliary heat to maintain a comfortable room temperature. When this is 50 degrees, one 250 watt bulb supplies sufficient heat for 75 chicks. This brooding is better adapted to warm weather operations.

Combinations of Systems

Combinations of hot water and space heaters are sometimes advisable. They are especially useful in circulating air and maintaining dry conditions in hard to ventilate pens (those over 40 feet wide) and buildings not having insulated roofs.

Two space heating units are generally used in pens for 5000 birds. Where used only on the first floor of a multi-story building, floor ventilators or flues, pass air to the top floors tempering all floors slightly.

Unit heaters must be cleaned regularly as dust collects rapidly in them. The use of fine screen wire or coarse cheese cloth will help eliminate excessive collections of dust.

Occasionally gas unit heaters are installed in conjunction with hot water systems. Generally the gas units are not necessary. They do however make it fairly easy to maintain a room temperature of 55°, usually held as ideal. The combination makes possible considerable movement of fresh air and a comfortable room temperature, a combination held desirable in the case of respiratory disease outbreaks.

There are combinations of gas hovers and gas unit heaters which are working very well. The hovers can be raised at an early age, helping to spread the birds evenly over the pen.

Oil tanks and fuel lines should be underground to prevent freezing. Trouble can be expected as temperatures drop to zero or below. It's also much safer from a fire hazard standpoint.

Hot Air Brooding

Hot air brooding had a run of popularity four or five years ago. It seemed like an economical way of getting central heating for costs of \$1500 to \$3000 for capacities of 10,000 to 15,000 birds. Today the nod seems to be given hot water brooding, although attempts to come up with exactly the right hot air system continue.

Furnace units with an output of from 400,000 to 600,000 B. T. U.'s have been used. Most installations do not have hovers, but have a duct leading down to within 18 inches of the floor around which approximately 500 chicks are brooded. Systems without hovers have worked satisfactorily although the present trend is toward a hovered plan similar to that used with hot water.

A brooding temperature of about 90° is maintained about 18 inches from the center of the outlet duct a few inches off the floor for the first few days and then the temperature is reduced rather rapidly. How the chicks act is the best guide as to temperature. They will form a ring about 1 foot to 1½ feet in diameter back from the duct when bedding down if they are comfortable.

Hot air brooding has not been without its problems. One of the first was chick dehydration which was overcome by adding water to the litter near the outlets. The use of old litter is not recommended because of the dust problem and the trend is to all new litter. The ammonia problem can be kept fairly well under control by adding 25 pounds of superphosphate to every 400 square feet of floor area.

Dust is a very real problem. Filters cannot take care of it and they are not being used. The dust not only gets into the motors and the furnace but if allowed to accumulate, it can become a very real fire hazard. The dust accumulates at the base of the furnace and should be removed at least after each brood.

WIRTHMORE POULTRY SERVICE DEPT.